



Пленарне засідання

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IMPROVING THE ENERGY EFFICIENCY OF AN AUTONOMOUS SOURCE OF ELECTRIC ENERGY BY REGULATING THE GAS DISTRIBUTION OF AN INTERNAL COMBUSTION ENGINE

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Annotation. *On the example of an autonomous source of electric energy with an internal combustion engine, the structure of a control circuit with reduced energy consumption is substantiated. The possibility of increasing the energy efficiency of the electric power generation system was evaluated.*

Key words: *autonomous power supply the internal combustion engine, cylinder, piston.*

Introductions. In most cases, to ensure reliable energy supply in cases of external power outages, autonomous energy sources based on internal combustion engines remain. The main sign of autonomous energy sources is the type of fuel used to generate thermal energy from the chemical: gasoline, diesel fuel, gas. However, in general, the design and principle of the chemical to mechanical energy converter itself remains similar in basic features: a two- or four-cycle cycle, a crank mechanism (Korbov-race mechanism), a piston, a cylinder, and the like. The second sign, in its significance for autonomous energy sources based on an internal combustion engine, is the principle of converting mechanical energy into electrical energy. There are two main types of autonomous sources of electrical energy: without inverters with inverters. Generators with inverters allow depending on the load of the network to regulate the speed of the internal combustion engine, thereby reducing fuel consumption and increasing the overall efficiency of the system as a whole. So using this scheme allows you to save more than half the total amount of fuel [1, 2].

However, it should be noted that the optimal operation of the internal combustion engine is possible at a certain engine speed. This can be seen from the efficiency diagrams of the internal combustion engine, which are dome-shaped with a maximum at 2500-3500 rpm, depending on the design. A decrease in the engine speed leads to a deterioration in the filling of the fuel-air mixture and the exhaust of the engine, accompanied by an intake of exhaust gases into the intake manifold and the ejection of part of the combustible mixture into the exhaust pipe. Energy losses when these effects occur can reach up to 20%, which significantly reduces the effect of using an inverter when generating electric energy.

Given the foregoing, to improve the energy efficiency of an autonomous power source with an inverter based on an internal combustion engine, it is possible by regulating the gas distribution mechanism.

Aim. The purpose of this study is to determine the operation algorithm and parameters of the control system of an autonomous source of electric energy with an internal combustion engine by

controlling the gas distribution of an internal combustion engine in order to increase the overall efficiency.

Materials and methods.

When considering the opening and closing angles of the intake and exhaust valves, we can conclude that there is a need to narrow the intake and exhaust phases (fig. 1).

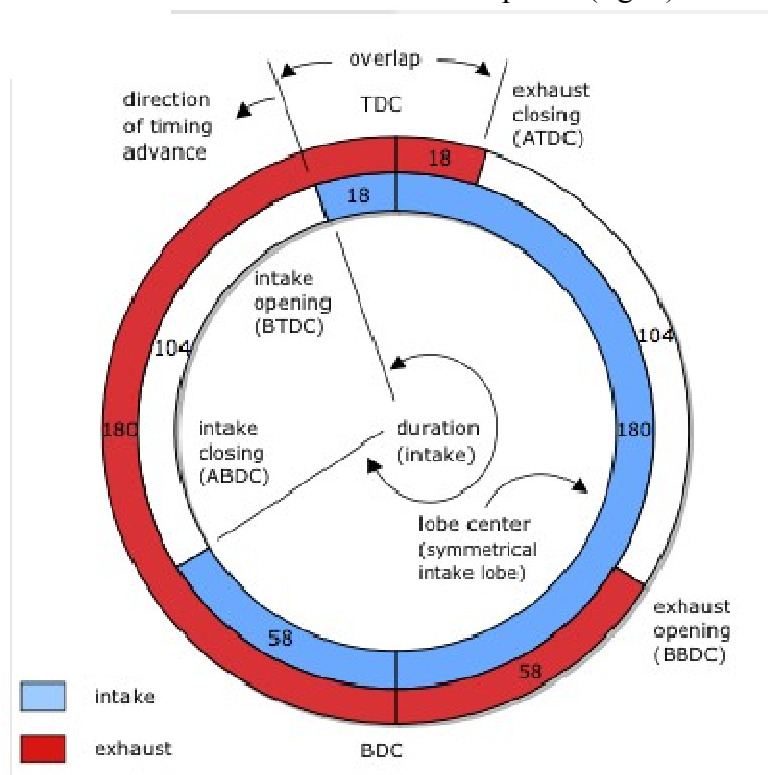


Figure 1 - Graph of change of efficiency of autonomous power supply from degree of compression

Conclusions. To increase the efficiency, it is necessary to reduce the values of the opening and closing angles of the intake and exhaust valves of the engine gas distribution system.

References

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MAIN CRITERIA FOR THE PREPARATION OF THE MASTER'S EDUCATION PROFESSIONAL PROGRAM "ELECTROMECHANICAL AND MECHATRONIC SYSTEMS OF ENERGY PRODUCTS"

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Annotation. The article is devoted to the main criteria of preparation of masters of educational - professional program "Electromechanical and mechatronic systems of energy intensive industries" specialty 141 - Electricity, electrical engineering and electromechanics. The current problem of modern higher education is the inconsistency of the structure and quality of specialist training and labor market demand. In this regard, one of the most important tasks of